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10/583,942	06/22/2006	Atsushi Sakurai	8007-1111	1454

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EXAMINER	
HORNING, JOEL G	
ART UNIT	PAPER NUMBER
1792	

NOTIFICATION DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DocketingDept@young-thompson.com

Office Action Summary	Application No.	Applicant(s)	
	10/583,942	SAKURAI ET AL.	
	Examiner	Art Unit	
	JOEL G. HORNING	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 4-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 4-16* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Claims

1. In the response of 10-13-2009, applicant has: amended claims 1, 4, 5 and 7-16 and cancelled claims 2, 3 and 17-19. Claims 1 and 4-16 are currently pending.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. **Claims 8, 11, 12 and 16** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 8, 11 and 12 used to depend upon claim 3 (currently cancelled), which required that the metal compound of claim 1 be a lead compound. However, claim 1 has been amended to exclude the possibility of the compound being a lead compound, instead requiring that it be a zirconium or titanium compound. **Claim 8** now requires that the material comprise a titanium or zirconium compound of claim 1 in combination with a tetrakis (1-methoxy-2-methyl-2-propoxy) titanium compound and a tetrakis (1-methoxy-2-methyl-2-propoxy) zirconium compound. The examiner can find no support in applicant's disclosure for this combination of precursors. Likewise, **claim 11**, also now requires that the compounds that make the material of claim 8 be used

together, which is not supported. **Claim 12** now requires that a titanium or zirconium compound of claim 1 be used in combination with tetra(t-butoxy)titanium and tetra(t-butoxy)zirconium, which is not a supported combination of precursors.

3. **Claim 16** is rejected for depending upon claim 8.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

1. **Claims 1 and 4-16** are rejected under 35 U.S.C. 103(a) as being unpatentable over Desu et al (US 5431958) in view of Jones (WO 03/035926, as supplied by applicant).

Desu et al teaches that in MOCVD for PZT, a lead precursor, a zirconium precursor and a titanium precursor are vaporized using bubblers (col 6, lines 11-41) and mixed in the precursor line (see figure 2), forming a vaporous precursor material

of the three precursors which the substrate is then exposed to, causing the deposition of the PZT film (which it is readily apparent would require that the precursors actually decompose) (col 7, lines 10-21).

MPEP 2144.04 (IV) states: "selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results." Thus it would have been obvious to a person of ordinary skill in the art to mix the precursors before vaporizing them instead of afterwards.

Desu et al further teaches that tetra(t-butoxy) titanium and tetra(t-butoxy) zirconium are known MOCVD precursors for those metals (col 5, lines 25-30), but does not teach using amino donor functionalized alkoxy titanium and zirconium precursors of formula I as required by claim 7.

However, Jones is also directed towards vapor deposition precursors (generally, as well as some metals specifically) (page 1, paragraph 1). It teaches that metal alkoxide ligands are desirable for precursor compounds, but they have some undesirable properties. Specifically t-butoxide is used as a ligand, but it is highly moisture sensitive (page 4, paragraph 3 teaches that it is susceptible to hydrolysis), which causes it to be less stable and have a short shelf life (page 2). In order to overcome this undesired property of the ligand, Jones teaches substituting t-butoxide zirconium and titanium precursors with precursors which read on applicant's claimed compounds. The case where R^1 and R^2 are alkyl groups, from which C_1-C_4 is readily apparent, X is NR^2, and x=0 **(claims 1, 4 and 5)**. These

compounds are taught to be less water sensitive and susceptible to hydrolysis than the t-butoxy compounds (page 3, paragraphs 2-4).

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention to substitute the t-butoxide titanium and zirconium precursor compounds of Desu et al in the process for depositing PZT with the titanium and zirconium compounds of Jones, which read upon formula I, in order to reduce the water sensitivity (susceptability to hydrolysis) and instability of the organometallic precursors and thus produce a precursor with a longer shelf life, which is less likely to react prematurely **(claims 6, 7, 9, 10 and 13-15)**.

Alternately, it would have been obvious to a person of ordinary skill in the art at the time of invention to substitute only some of the t-butoxide titanium and zirconium precursor compounds of Desu et al with the titanium and zirconium compounds of Jones, which read upon formula I, in order to reduce the water sensitivity (susceptability to hydrolysis) and instability of the organometallic precursors and thus produce a precursor with a longer shelf life, which is less likely to react prematurely.

Furthermore, MPEP 2144.06(I) states: "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted). Thus it is obvious to use the

combination of titanium and zirconium precursors of the form of t-butoxide and titanium and zirconium precursors which read upon formula I, in the process of Desu, since they were taught by the prior art to be useful for the same purpose, and would be now used in combination for that very same purpose **(claim 12)**.

2. Regarding **claims 8, 11 and 16**, Desu et al does not teach using tetrakis(1-methoxy-2-methyl-2-propoxy) titanium and zirconium compounds in the PZT deposition process.

However, as discussed previously, Jones teaches that tetrakis(t-butoxide) precursors for titanium and zirconium are susceptible to hydrolysis and are highly water sensitive. In addition to teaching using compounds which read upon formula I, it also teaches using (1-methoxy-2-methyl-2-propoxy) compounds of titanium and zirconium as another method to produce more stable precursors (page 3, paragraphs 2-3). Specifically tetrakis(1-methoxy-2-methyl-2-propoxy)titanium (page 11) and tetrakis(1-methoxy-2-methyl-2-propoxy)zirconium (page 7) compounds are taught as precursors of this form.

Thus it would have been obvious to a person of ordinary skill in the art at the time of invention that when substituting some of the titanium and zirconium tetrakis (t-butoxide) precursor compounds with the more stable precursors which read upon formula I, to also substitute some of the tetrakis(t-butoxide) precursors with the tetrakis(1-methoxy-2-methyl-2-propoxy) forms of these compounds in order to likewise improve the precursors' shelf lives and reduce the processes sensitivity to hydrolysis and water. These precursors were all known to be suitable substitutes for

the t-butoxy precursors of titanium and zirconium, which would be expected to produce predictable results.

Also, applicant is reminded of MPEP 2144.06(I): "It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition to be used for the very same purpose.... [T]he idea of combining them flows logically from their having been individually taught in the prior art." In re Kerkhoven, 626 F.2d 846, 850, 205 USPQ 1069, 1072 (CCPA 1980) (citations omitted). Thus it is obvious to use the combination of titanium and zirconium precursors of the form of tetrakis(1-methoxy-2-methyl-2-propoxy) and titanium and zirconium precursors which read upon formula I, in the process of Desu, since they were taught by the prior art to be useful for the same purpose, and would be now used in combination for that very same purpose **(claim 11)**.

MPEP 2144.04 (IV) states: "selection of any order of performing process steps is prima facie obvious in the absence of new or unexpected results." Thus it would have been obvious to a person of ordinary skill in the art to mix the precursors before vaporizing them instead of afterwards **(claims 8 and 16)**.

Response to Arguments

3. Applicant's arguments with respect to newly amended claims 1 and 4-16 have been considered but are not convincing in view of the new ground(s) of rejection necessitated by amendment.

4. Applicant's arguments directed to the Rhee et al reference on page 9 is convincing to show that Rhee et al does not teach using a methylene group for A at the same time as alkyl groups for R^1 and R^2, so the Rhee et al rejection has been withdrawn.
5. In response to applicant's arguments on pages 12-13 that Jones does not teach that tertiary alcohols have superior volatility to an alkoxide of secondary alcohols, Jones does not need to, it specifically teaches using tertiary alcohols, so it is obvious to use them. That Jones does not detail the properties of the tertiary alcohols that it teaches does not render the taught tertiary alcohols non-obvious. According to MPEP 2145 (II): Mere recognition of latent properties in the prior art does not render nonobvious an otherwise known invention. In re Wiseman, 596 F.2d 1019, 201 USPQ 658 (CCPA 1979).
6. Additionally, attorney's arguments of a trend in volatility, which attorney argues that some of their claimed precursors do not follow, is not an appropriate substitute for evidence that such a result is actually unexpected. MPEP 716.01(c)(II) states: The arguments of counsel cannot take the place of evidence in the record. In re Schulze, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965). Examples of attorney statements which are not evidence and which must be supported by an appropriate affidavit or declaration include statements regarding unexpected results, commercial success, solution of a long-felt need, inoperability of the prior art, invention before the date of the reference, and allegations that the author(s) of the prior art derived the disclosed subject matter from the applicant.

7. Furthermore, applicant's evidence comparing the volatilities of four precursors is not sufficient to demonstrate unexpected results compared to the realm of precursors taught by Desu and Jones.
8. Moreover, applicant's evidence does not demonstrate that all of the precursors within the claim boundaries would have superior properties compared to the comparative compounds.

Conclusion

No current claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOEL G. HORNING whose telephone number is (571)

270-5357. The examiner can normally be reached on M-F 9-5pm with alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael B. Cleveland can be reached on (571)272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. G. H./
Examiner, Art Unit 1792

/Michael Cleveland/
Supervisory Patent Examiner, Art Unit 1792